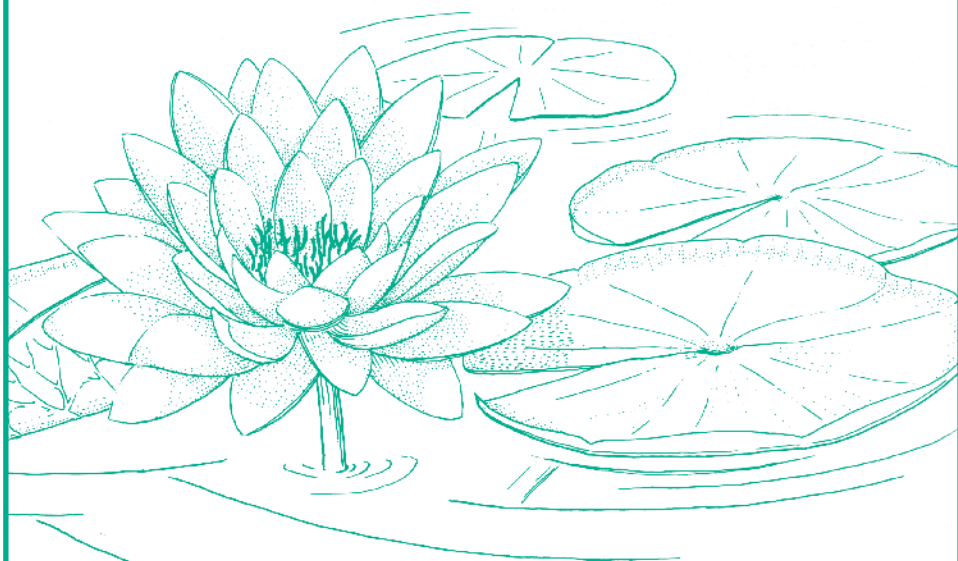
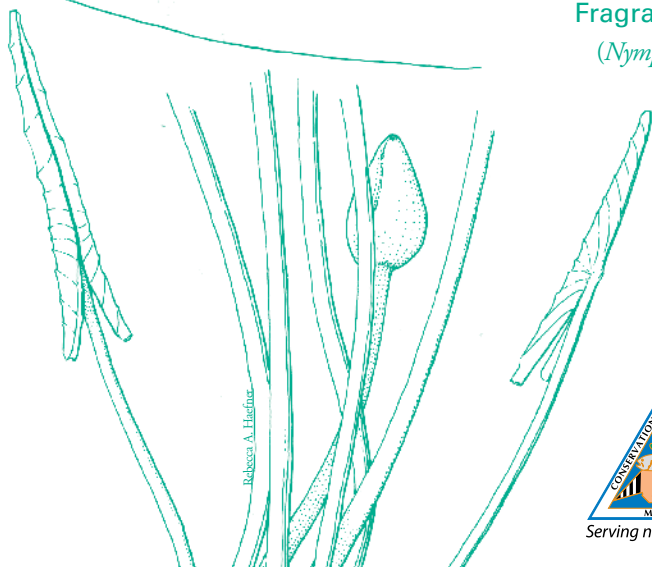


HOW TO ESTABLISH AQUATIC PLANTS IN YOUR POND



Fragrant Water Lily
(*Nymphaea odorata*)



Rebecca A. Hefner



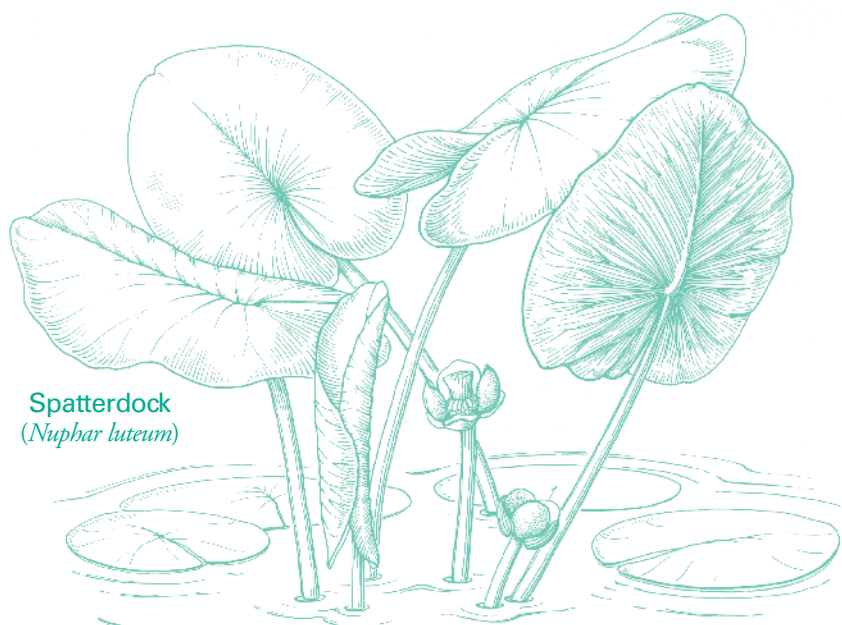
Why Are Aquatic Plants Important?

Aquatic plants are an essential ingredient in a quality pond or lake. They form the base of the food chain and provide energy for nearly every form of life in the aquatic ecosystem. In addition to providing food for invertebrates, fish, mammals and waterfowl, plants also create shelter and reproductive habitat for countless aquatic organisms. Plants also help improve water quality and control erosion.

Some people mistakenly lump all aquatic plants together, referring to them as “seaweed” or grass. While some species do cause problems for boaters, swimmers or anglers, many native species are desirable in lakes and ponds. This guide is intended to help you choose and establish appropriate plants for your pond or small lake.

Most ponds will develop an aquatic plant community over time. Often, the first plants to appear in new ponds are nuisance species—not those best suited for a quality pond—and the end result is a plant community that requires considerable management. It often takes years for some desirable species to colonize.

By planting those species best suited to the conditions of your pond and your preferences, you can improve plant diversity and reduce the number of nuisance species in the lake, especially algae. Selecting species that reproduce more slowly, are easy to control, and those that grow in a select range of water depths can help you develop a pond plant community beneficial to fish and wildlife, as well as one you can enjoy, too.



Spatterdock
(*Nuphar luteum*)

Rebecca A. Haeffer

Plants to Consider

Aquatic plants fall into four categories—emergent, floating, shoreline and submerged. Not all species within each category are well suited for all water bodies. Typically, small lakes and ponds do best with slow-growing, shorter species that grow sparsely. This booklet highlights the following 14 plants because they are well suited for Missouri ponds and are easy to obtain. For more information, consult *Water Plants for Missouri Ponds*, published by the Missouri Department of Conservation, which is a thorough reference book describing more than 40 species of aquatic plants. Before planting, consider consulting conservation department staff for advice.



Arrowhead
(*Sagittaria calycina*)

Rebecca A. Haeffer

Shoreline Plants growing at the water's edge



Don Kurz

Mud Plantain

(*Heteranthera reniformis*) Small, glossy, kidney-shaped leaves and a trailing stem; will not inhibit fishing.



Jim Rathert

Sweet Flag

(*Acorus calamus*) Looks like young cattails; ranges from 2-4 feet tall; grows in clumps.



Don Kurz

Water Plantain

(*Alisma triviale*) Oval leaves with a thick flower stalk in middle; grows 1-3 feet tall; bears many tiny white flowers and small seed heads.



Don Kurz

Lizard's Tail

(*Saururus cernuus*) Striking plant with heart-shaped leaves and a zigzag stem; grows well in shady areas.



Burhead

(*Echinodorus berteroi*) Gets its name from clusters of beaked seeds that develop in the fall; many small white flowers, each with three petals.

Illustrations by Rebecca A. Haefner

Emergent Plants rooted in the water with stems and leaves standing above water



Jim Rathert

Pickerel Weed

(*Pontederia cordata*) One of the few water plants to produce striking blue flowers; heart-shaped leaves; grows up to 3 feet tall.



Jim Rathert

Spatterdock

(*Nuphar luteum*) In the water lily family; has oval, floating "lily pad" leaves; blossoms are unassuming greenish globes 2 inches wide.

Emergent (continued)



Don Kurz

Arrowheads

(*Sagittaria* spp.) Arrow-shaped leaves; bears a stalk with white, three-petaled flowers in whorls; spread easily by runners; one species has grasslike leaves.



Jim Rathert

Broadfruited Bur Reed

(*Sparganium eurycarpum*) Zigzag flower stems; grows up to 5 feet tall; grasslike leaves.



Jim Rathert

Soft Rush

(*Juncus effusus*) Grows in dense clumps of a few to several hundred leafless stems; grows in shallow water, but doesn't invade deeper areas.



Jim Rathert

Spike Rushes

(*Eleocharis* spp.) Grasslike species that come in a variety of sizes, from ankle- to shoulder-high; Missouri is home to 13 different species.

Floating Plants with many floating leaves



Jim Rathert

Fragrant Water Lily

(*Nymphaea odorata*) In the water lily family; has oval, floating "lilypad" leaves; blossoms are unassuming greenish globes 2 inches wide.

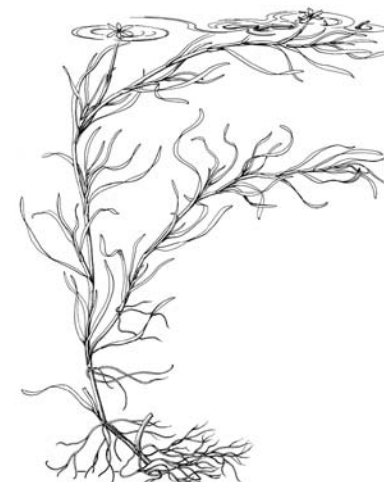
Submerged Plants completely under the water or nearly so



Jim Rathert

Wild Celery

(*Vallisneria spiralis*) Leaves almost completely submerged, with just the tips showing; up to 7 feet.



Water Star Grass

(*Heteranthera dubia*) Attractive yellow flowers near or just above the water's surface; up to 6 feet long.

Where to Acquire Aquatic Plants

Some aquatic plants are easy to locate because they are commercially produced for the ornamental garden industry, as well as for planting in new wetland developments. Others are more difficult to find. Prices vary depending upon species, whether you are purchasing root stock or adult plants, and the cost of shipping. It is strongly recommended that you obtain plants from Missouri or at the least, the Midwest, since these plants are most likely to survive Missouri's weather and habitats. Local nurseries and water garden stores may have some species, especially emergent and floating.

Another way to obtain plants is by transplanting or harvesting them from the pond of a neighbor or other private landowner. Always ask for permission first. Plants may not be removed from conservation areas without Missouri Department of Conservation permission. They also may not be removed from the rights of way of any state or county highway or roadway without permission from the Missouri Department of Transportation (MoDOT).

How to Establish New Plants and Help Them Succeed

Establishing aquatic plants takes a bit more work than simply planting a shoot and watching it grow. Sometimes conditions in a pond, lake or wetland make them only marginally suited for plant establishment. These conditions—and ways to solve some of the obstacles they present—are described below.

Turbid Water (Excessively Murky)

Turbid water and excessive algal growth can obscure the sunlight plants need. If your pond's turbidity is due to plankton (microscopic green algae), you may be able to improve clarity by eliminating nutrient input and, when other methods fail, limiting algal growth by selectively using herbicides. Consult the Missouri Department of Conservation's Aquaguide publication, *Algae Control in Lakes and Ponds*.

If turbidity is due to suspension of clay particles, you may be able to improve clarity by settling out the particles by using dry hay or gypsum. If the turbidity is the result of fish or aquatic animals disturbing bottom sediments, the numbers of these animals must be reduced in order to improve water clarity. See the Aquaguide titled *Clearing Ponds That Have Turbid (Muddy) Water*.

Extreme Fluctuations in Water Level

Dramatic water level fluctuations can strand and kill plants. Water level fluctuations are difficult to address, especially if water levels drop more than 18 to 24 inches during the growing season. However, here are a few planting tips to improve the chances of new plant survival. First, plant submerged and floating species in water at least 3 feet deep. This allows adult plants to experience a substantial water level drop and still remain in adequate water. It also allows adult plants to spread into deeper water as levels drop. Second, be sure to place emergent plants in water 6 to 12 inches deep. Most species will survive water level drops as long as the soil remains moist. It also can be beneficial to plant a couple of times as water levels drop. This helps ensure that some plants are at an optimal water depth during the peak growing season.

Poor Soil

Poor bottom material, such as rock or hard clay, also limits plant survival. Aquatic plants can grow well in most soil and bottom types with a few exceptions. Bottoms composed of bedrock, large rock or very hard clay are unsuited for plants. However, loose gravel and clay that can be dug into with a hand trowel can grow aquatic plants. It often takes a few trial plantings to determine whether a species will survive and thrive in a particular bottom type.

Grazing Animals

Turtles, grass carp, muskrat, waterfowl and even deer can set back or wipe out young aquatic plants. Establishing new plants can be especially challenging in older ponds that have many plant-eating animals; new plants usually need to be protected by exclosures—protective cages and fences. In new ponds with smaller populations of plant-eating animals, it may not be necessary to physically protect plants.

Exclosures: Protective Cages and Fences for New Plants

Exclosures can be simple in design, but must be durable and strong enough to protect the plant colonies, sometimes for a few years. They should be made of 2x4 welded wire or coated welded wire that is 36 or 48 inches tall, depending upon the water depth. This material lasts longer than thinner-gauge wires such as chicken wire. Welded wire in 50-foot rolls is easiest to handle. Metal T-posts or rebar can be used to secure an exclosure along its seams and corners. They can be connected to the wire with aluminum fence ties that are used in chain link fence construction. Hog rings (1/2 inch) are best for connecting two ends of wire together.

Fence Enclosures are useful for protecting emergent plants or very large areas of submerged plants. They can be any shape and have any number of posts. It is easiest to set the posts with a post driver first, then unroll the fencing material. Fasten one end of the material to one corner post with aluminum fence ties or wire, and begin to wrap the material around the perimeter of the enclosure, securing it to each post. Be sure to secure the two ends of the fence material to the same post, leaving no openings. Make sure the bottom of the fence is flush with the bottom of the pond. Remove any large rocks or debris from under the fence that may allow an entry for a hungry animal. The top of the fence should be at least 12 inches above the maximum water level to prevent animals from climbing or swimming over.



Round Enclosures are used to protect floating species and larger plantings of submerged species. They are constructed by cutting a 25-foot length of 2x4 welded wire and wrapping the wire into a hoop. Secure the two ends together with hog rings. Cut two 25-foot-long pieces of plastic water line pipe. Secure one piece to the top of the hoop cage and one to the bottom using plastic zip ties. This gives the cage stability. Secure the cage to the pond bottom with two stakes.



Submergible Enclosures are practical for protecting smaller plantings of submerged species. They are constructed by folding the sides of an 8-foot-long piece of welded wire to create a rectangular box. Secure the sides with hog rings or 2-inch pieces of wire twisted like a bread tie. The bottom of the box remains open; place the box over your plantings and secure to the bottom of the pond with a stake.



Handling, Planting and Care of New Plants

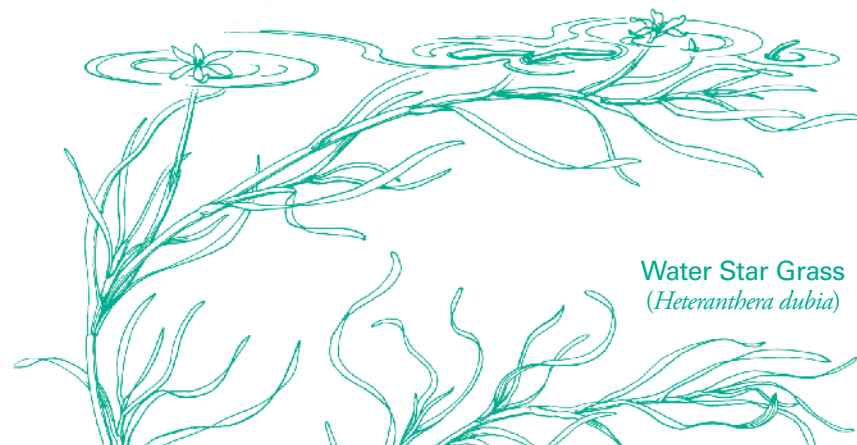
Bare-Root vs. Potted Plants

As a general rule, transplants with soil are more vigorous and successful than bare-root plantings. Submerged bare-root plants often will float up and die if they are not carefully secured in the pond bottom. Most emergent species, including arrowhead, often can be successfully planted as bare-root transplants. However, spread of new plants may be slower with bare-root transplants than with potted transplants. Remember to keep plants moist when transporting them.

Many species will grow and thrive better if they are cultured in pots for a few weeks before they are planted permanently in the pond bottom. Place plants in regular plastic nursery pots and cover the roots with the darkest and most fertile pond soil available. Place these potted plants within the enclosure. Tying three or four pots together with wire or zip ties will help keep them from tipping over. Once the plants have grown new shoots, sprouts and roots, remove the plant and soil from the pot and place it in the pond bottom. Handle them carefully to minimize damage to foliage. These cultured plants often exhibit extensive growth and expansion far exceeding that of bare-root transplants.

Plants should be planted approximately 3 to 4 feet apart in rows to allow for growth. Submerged and floating-leaved plants should be placed along the 3- to 4-foot depth contour of the pond. Emergent plants should be placed near the shore from the waterline out to depths of 6 to 12 inches. Do not place floating plants next to submerged plants so adequate light can reach young submerged plants.

Plantings may be made anytime after early May. Later plantings often exhibit higher survival because the water warms, day length increases and water levels stabilize. Plants should not be planted later than the end of August.



Water Star Grass
(*Heteranthera dubia*)



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Sweet Flag (*Acorus calamus*)